

What is claimed is:

- 1 1. An interface device for interfacing instruments to a simulation system to
2 enable a user to interact with the simulation system to perform a medical procedure on a
3 simulated anatomy of a virtual patient, said interface device comprising:
4 a peripheral in the form of a mock medical instrument capable of selective
5 manipulation by the user;
6 an orifice for receiving said instrument;
7 a guide tube for directing said instrument from said orifice into said interface device;
8 a capture mechanism for engaging said instrument to enable said interface device to
9 measure manipulation of and provide force feedback to said instrument; and
10 a sensing assembly to measure manipulation of and provide force feedback to said
11 instrument, wherein said sensing assembly includes:
12 motion detection means to measure manipulation of said captured instrument
13 and provide signals indicating said measured manipulation to said simulation system
14 to simulate said medical procedure; and
15 force application means to apply force feedback to said captured instrument in
16 response to control signals from said simulation system.
- 1 2. The device of claim 1 wherein said instrument includes an endoscope.
- 1 3. The device of claim 1 wherein said instrument includes a nested instrument
2 assembly, and said interface device further includes:
3 a plurality of capture mechanisms each engaging a corresponding instrument
4 of said instrument assembly to enable said interface device to measure manipulation
5 of and provide force feedback to that instrument; and
6 a plurality of sensing assemblies each measuring manipulation of and
7 providing force feedback to said corresponding instrument.
- 1 4. The device of claim 1 wherein said interface device further includes a pivoting
2 mechanism to pivot said orifice.

1 5. An interface device for interfacing instruments to a simulation system to
2 enable a user to interact with the simulation system to perform a medical procedure on a
3 simulated anatomy of a virtual patient, said interface device comprising:
4 a plurality of peripherals in the form of mock medical instruments capable of selective
5 manipulation by the user;
6 a plurality of orifices for receiving said instruments;
7 a plurality of guide tubes for directing said instruments from said orifices into said
8 interface device;
9 a plurality of capture mechanisms for engaging said instruments to enable said
10 interface device to measure manipulation of and provide force feedback to said instruments;
11 and
12 a plurality of sensing assemblies to measure manipulation of and provide force
13 feedback to said instruments, wherein each said sensing assembly includes:
14 motion detection means to measure manipulation of a corresponding captured
15 instrument and provide signals indicating said measured manipulation to said
16 simulation system to simulate said medical procedure; and
17 force application means to apply force feedback to said corresponding
18 captured instrument in response to control signals from said simulation system.

1 6. The device of claim 5 wherein at least one of said instruments includes a nested
2 instrument assembly.

1 7. In an interface device for interfacing instruments to a simulation system to
2 enable a user to interact with the simulation system to perform a medical procedure, a capture
3 mechanism for engaging an instrument inserted within the interface device to enable the
4 interface device to measure manipulation of and provide force feedback to that instrument,
5 said capture mechanism comprising:
6 a grasping member for engaging said instrument to enable said interface device to
7 measure manipulation of and provide force feedback to said instrument; and
8 an actuator for activating said grasping member to engage said instrument in response
9 to user manipulation of said instrument.

1 8. A method for interfacing instruments to a simulation system, via an interface
2 device, to enable a user to interact with the simulation system to perform a medical procedure
3 on a simulated anatomy of a virtual patient, said method comprising the steps of:

4 (a) inserting a peripheral in the form of a mock medical instrument into said interface
5 device via an orifice and guide tube, and selectively manipulating said instrument within said
6 interface device;

7 (b) engaging said instrument, via a capture mechanism, to enable said interface
8 device to measure manipulation of and provide force feedback to said instrument;

9 (c) measuring manipulation of said captured instrument and providing signals
10 indicating said measured manipulation to said simulation system to simulate said medical
11 procedure; and

12 (d) applying force feedback to said captured instrument in response to control signals
13 from said simulation system.

1 9. The method of claim 8 wherein said instrument includes an endoscope.

1 10. The method of claim 8 wherein said instrument includes a nested instrument
2 assembly, and step (b) further includes:

3 (b.1) engaging each instrument of said instrument assembly to enable said
4 interface device to measure manipulation of and provide force feedback to that
5 instrument;

6 step (c) further includes:

7 (c.1) measuring manipulation of said each instrument and providing signals
8 indicating said measured manipulation to said simulation system; and

9 step (d) further includes:

10 (d.1) applying force feedback to said each instrument in response to control
11 signals from said simulation system.

1 11. The method of claim 8 wherein step (a) further includes:

2 (a.1) pivoting said orifice to a desired orientation.